



Finnish Institute of  
Occupational Health

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## **THL and FIOH in the Finnish research and development field**

Report for the international evaluations of the National Institute  
for Health and Welfare (THL) and the Finnish Institute of  
Occupational Health (FIOH/TTL)

Work group (in alphabetical order): Keijo Halonen (FIOH),  
Kirsti Husgafvel-Pursiainen (FIOH), Ilmo Keskimäki (THL),  
Jukka Lindeman (THL), Jussi Simpura (THL), Jouni Toikkanen (FIOH)

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<sup>1</sup> Jussi Simpura and Jouni Toikkanen wrote Chapters 1–3 and 5. Kirsti Husgafvel-Pursiainen, Jukka Lindeman, Ilmo Keskimäki and Keijo Halonen conducted the bibliometric analysis (Chapter 4).

## 1. Introduction

In recent years, the role, organizing and financing of research and development (R&D) activities have been under intense discussion in Finland. This discussion has concerned both universities and state research institutions. Several reports have been produced. This has resulted in new policy definitions and re-organization. Universities have passed through a merger process leading to increased independence, new financing systems, and fewer and larger units. Some state research institutions have been re-organized. In September 2013, the Finnish Government decided on the development policy for state research institutions. The new policy involves further restructuring and changes in funding, and aims for more collaboration between state research institutions and universities.

This article aims to present to the evaluation groups an overview of the topical R&D issues in Finland and the position of the National Institute for Health and Welfare (THL) and the Finnish Institute of Occupational Health (FIOH) in this field. By R&D we mean the activities of basic research, applied research and experimental development. In the policy-making discourse a third letter "I" for innovation is added to R&D, emphasising the aim to introduce novelties into practical life. Thus, R&D&I would be the correct abbreviation in today's political context in Finland. The R&D activities of THL and FIOH certainly include this aspect. Both institutes are also expert institutes (see Appendix 2). The proportion of the R&D activities (measured as costs) of all activities is about one third at THL and somewhat larger at FIOH.

Here we use the figures from Statistics Finland to describe the dimensions of R&D activities. Although comparability problems exist, we believe that these are still the best available indicators. We also use bibliometric analysis of scientific publishing to illustrate THL and FIOH's position in the R&D field. Scientific publications are *one* output of R&D activity; scientific publishing aims to share new knowledge but also to ensure the quality of R&D. The bibliometric method makes visible the research profile, quality and partnerships of the two institutes only to the extent that can be based on scientific publishing.

The bibliometric analysis of publications provides a detailed picture of the research profiles of the two institutes. In addition to standard research reports and articles, the institutes also publish in national scientific journals and professional publications. This is important for welfare- and work life-related activities in particular, as these issues are more local and national by nature than health issues. It is important to remember that research is only a part, and not always the dominating part, of the core activities of THL and FIOH (see Appendix 2). Moreover, from the point of view of the effectiveness of the institutes, publications and other products in national languages may be more influential than international scientific articles, as decision-makers and professionals seldom turn to international sources in search of evidence or support for policy-making. Therefore, an attempt will be made below to also describe the publication activities on a national level.

Another aspect that can be illustrated by bibliometric analysis is the collaboration of the two institutes with universities and other research institutions, both on national and international levels. Some background information is helpful in considering this aspect. No systematic data collection on this issue is available. The following is based on the annual reports of the institutes and some national special efforts to survey the field. On a national level, the collaboration has a number of different forms:

- Joint publications (on both international (see the bibliometric analysis below) and national levels)
- Joint research projects (including consortia etc.)
- Joint infrastructure (e.g., laboratory equipment)
- Joint research and teaching posts.

## 2. R&D Activities in Finland

R&D spending amounted to EUR 6,8 billion in 2012 in Finland. The GDP share of R&D expenditure was 3.55 per cent (Official Statistics of Finland, Research and Development, October 31, 2013). Of the total amount, the share of business enterprise is about 70 per cent. The Government allocated roughly 2 billion euros for R&D activities. Almost half of the money was allocated via R&D funds (Academy of Finland, TEKES (The Finnish Funding Agency for Technology and Innovations), one fourth as basic funding to universities, and about 300 million euros as basic funding to state research institutions.

Statistics Finland lists 18 state research institutions in 2013. These institutions had a total budget of EUR 603.5 million for 2013. On average, half of the expenses were covered by the state budget (the previously mentioned 300 million euros) and the other half from external sources among, including not only government funding but also EU and various other R&D funding. R&D funding from EU sources constitutes about 50 million euros annually. Some minor private or tripartite funds for special themes (like the Finnish Work Environment Fund) also play a role in funding R&D activities in the field of health and welfare.

The biggest state research institution is VTT, the Technical Research Centre of Finland. Its share of the total expenditure of public sector R&D is almost half and of external funding almost two thirds (EUR 286/EUR 194). The next six in the order of total R&D expenditure are the Finnish Forest Research Institute, the National Institute for Health and Welfare (THL), MTT Agrifood Research, the Finnish Meteorological Institute, the Finnish Institute of Occupational health (FIOH), and the Geological Survey of Finland.

THL reported a state budget figure of 33.5 million euros for R&D in 2013. Together with funding from external sources, the total actual R&D expenditure of THL in 2012 was reported to be 40.4 million euros. The respective figures for FIOH were 18.4 million euros and 28.5 million euros. Note that the basis for figures for 2012 (reported actual expenditure) and 2013 (state budget figures) are different. The budget figures also contain a large number of activities that are not R&D in the strict sense. In relative terms, THL uses more than ten per cent and FIOH more than six per cent of the total state budget funding for governmental R&D institutions (excluding universities).

The preparation and co-ordination of the national R&D policy is carried out by the Research and Innovation Council of Finland. The Ministry of Education is responsible for the implementation of the policies in academic research, and the Ministry of Employment and the Economy is responsible for national development and innovation policies. R&D funds, the Academy of Finland and TEKES steer and promote R&D by defining R&D programmes and allocating funds to projects. Individual state research institutions are under the governance of their parent ministries. The principal governance method is performance management, which is the standard arrangement in Finnish public administration. The ministries annually set and follow the outcome and performance targets of their R&D institutions.

## 3. THL and FIOH in the reforming of R&D policies and structures

In essence, the state research institutions originate from the need to govern serious threats to society or from the need to promote industries and agriculture. THL's purpose in the health branch is to control communicable diseases and in the welfare branch to control poverty. FIOH was established to prevent serious occupational illnesses and accidents in the post-war industrializing society. When the Nordic welfare states were set up in the 1970s, the institutes were given the role to supporting evidence-based policies and the decision-making of minis-

tries. Many of them were given tasks as public authorities and tasks of implementing policies. Ministerial steering was consolidated: since the 1990s the institutes have been managed as any other public agency by their governing ministries, using the performance management protocol. "Sectoral research" has been used in Finland since the 1990s as a term to describe research that produces information used in some particular ministry's field of activities (sector).

The policy-making of the last ten years or so has treated these institutes almost solely as research institutions, almost forgetting their other functions. The main topics in the discourse have been:

- Do state research institutions sufficiently cover cross-sectoral issues and grand, national-level challenges?
- Do state research institutions support the Government's decision- and policy-making?
- Are state research institutions too involved in academic-type research and do they thus overlap with universities?
- Are state research institutions organized into units that are too small, considering their productivity and their capacity to tackle strategic issues?

Evaluations have a prominent role in Finnish R&D policy-making. The above mentioned issues have been under scrutiny in many assessments of the state research system or of individual institutions. A number of working groups and expert advisors have written reports and proposals. In general, the evaluations have shown positive results for the relevance and operational efficiency of the research institutions. The proposals have also led to many reforms. The Ministry of Social Affairs and Health (MSAH) evaluated its research institutions in 2007 (Huttunen, J & Mäki-Lohiluoma, K-P: 2007). The recommendations of the evaluation led to the establishment of THL by combining the National Public Health Institute (KTL) and the National Research and Development Centre for Welfare and Health (STAKES). The new institute, the National Institute for Health and Welfare, began its operations at the beginning of 2009. It is also noteworthy that the merger of THL and FIOH (Finnish Institute for Occupational Health) has been a persistent topic in the debate around research institutions. Evaluations and other reports have so far found no benefits from this merger.

For the comprehensive development of the state research system, in 2006, the Government nominated a working group chaired by Professor Neuvo. The findings of the working group's report (Sektoritutkimustyöryhmän mietintö 2006) <sup>1</sup> were exploited in the Government's resolution regarding the steering of sectoral research. The Government appointed an Advisory Board for Sectoral Research in 2007. The Advisory Board's tasks included the identification of society's research needs, the generation of a common research agenda and the generation of research programmes to execute the agenda. Four research areas were defined and the research needs of the areas were explored. The funding of sectoral research did not change at all at this stage. Again, the Government asked the Board to evaluate the state research system and generate proposals for the structural renewal of sectoral research. Whereas the evaluation report (Sektoritutkimuksen neuvottelukunta 2008) recommended only a few structural changes, it recommended a change to funding; that the National Advisory Board of Sectoral Research should have an instrument (20 million euros annually) for the funding of cross-sectoral research projects and programmes. The recommendation was not implemented. Instead, the Advisory Board was itself evaluated, and then discontinued, identified as too weak a body for the co-ordination of sectoral research.

The Finnish "innovation system" was evaluated in 2009 (Työ- ja elinkeinoministeriö 2009) by an international expert group, commissioned by the Ministry of Education and the Ministry of Employment and the Economy. While the state research institutions were not the main focus of the evaluation, the recommendations included the notion of "a true reform of sectoral re-

search”: academically-orientated research was to be moved to universities and the remaining tasks should be organised into four to five units in accordance with larger societal needs (as opposed to the ministries’ administrative boundaries). This conclusion ended up in many R&D policy documents and is stated in the current Government’s Programme.

Anticipating the coming reform of the state research institute sector, the MSAH decided to establish a special network of its research institutions to bring more flexibility and synergy to research work. The network, called SOTERKO (see <http://www.soterko.fi>), started in February 2011 and followed the pattern of a respective network in the sector of nature resources, agriculture and forestry (the LYNET network; see <http://www.lynet.fi>). The SOTERKO network also aimed to show that some of the goals of the sector research reform can be achieved without changes in organizational structures and financing systems. The SOTERKO partners are THL, FIOH and the National Radiation Security Authority (STUK). SOTERKO made a plan for its first three full years (2012–2014) around five research programmes and one programme of development (data resources). In addition to these programmes, SOTERKO arranges seminars on various topics and provides a network for organizing short-term expert teams on topics related to its programmes. After less than three years of activity, SOTERKO now has established itself in the field.

In 2011, the Government appointed an expert group to outline the reform of sectoral research and, after various elaborations of the expert group’s recommendations, in September 2013 decided upon the principles of the reform. (Government Resolution on Comprehensive Reform of State Research Institutes and Research Funding, issued in Helsinki 5 September 2013).

The Government formulated the basis and goal of the reform as follows (Introduction of the Government’s decision):

The preparation and implementation of social policies, and the related decision-making, should be based on well-researched information. Society’s continuous development will be encouraged by ensuing long-term steering of decision-making, based on experiences gained and information on impacts. To achieve this goal, a systematic operating model is needed, to ensure the creation of a strong and horizontal knowledge based in support of societal decision-making and measures.

The main goals of the reform were (the first four of a list of eight goals):

- To strengthen multidisciplinary, high-level research of social significance
- To make research activity more effective and improve its relevance; by freeing up resources from fixed structures and support services
- To organize research institutes into larger and stronger wholes by field of research, taking account of the preconditions for developing the quality of research activities.
- To assemble part of research funding for allocation through open research funding, in order to enhance the relevance, demand-orientation, and multi-disciplinary approach of research. Here, the aim is to finance long-term problem-orientated and programme-based research that seeks solutions to the challenges facing society. National co-financing of EU projects will be incorporated into the same fund.

Reform measures included:

*Structural reforms:*

- A) Merging of research institutes
- B) Merging research institutes with the University of Helsinki
- C) Deeper co-operation between research institutes and universities
- D) Development of activities of research consortiums

*Research funding reforms:*

- E) Establishment of a strategic research funding instrument
- F) Strengthening research, assessment activity and report work to support the Government's decision-making
- G) Gathering of research funding from ministries.

Although none of the mergers are targeted towards THL or to FIOH, the resolution requires the following:

The activities of THL and FIOH will be assessed by 30 June 2014. This will include an evaluation of the suitability and compatibility of the institutes' strategic research areas, and of their key development and administrative tasks, taking account of fee-in requirements related to decision-making and steering within the Government.

In addition, thought will be given to the possible elimination of overlapping functions and the appropriate division of labour and research tasks between universities and research institutes.

Measure D above specifically mentions the strengthening and enlargement of the SOTERKO network.

For THL and FIOH, the most immediate and substantial consequences of the Government's decision come from the research funding reforms. The new funding instruments will be funded by transferring funding from the state research institutes to the Prime Ministers' Office and the new Council for Strategic Research, to be established at the Academy of Finland. In 2017, the former should have the amount of 12 million euros and the latter 70 million euros available for funding. Respectively, there will be a cut of 7 million euros for THL and 4 million euros for FIOH in their state funding in 2017. In principle, the state research institutes may win back some of the transferred money through successful project proposals for the new funding instrument. In practice, the state research institutes will lose a significant part of their stable basic funding and will have to prepare themselves for increased competition for more unstable money.

It is worthwhile noting that an international evaluation of the Academy of Finland was completed in the autumn of 2013. One of its recommendations was that the Academy should adopt a more active role in creating strategic research themes and programmes. Now, through the reform of state research institutions and research funding, this will be realized.

*The unexpected budget cuts in the spring of 2013* had even more dramatic consequences for institutes such as THL and FIOH than the reform of state research institutes. The decision was taken by the Government as part of a broader effort to reduce and redirect government expenditure in the midst of the economic crisis. The reduction in research funding concerned only the MSAH sector (consisting of THL, FIOH, STUK and research at the national Social Insurance Institution of Finland, KELA). Originally, the reduction was supposed to be 30 million euros, permanently, from 2015 onwards. This was about one fourth of the basic funding of these institutions from the state budget. In further negotiations, it was decided that the reduction be spread over three years, and the sums were reduced. However, they have remained significant. The final decisions are still missing, but it is expected that the cumulative cuts from 2013 to 2017 will be about 7 million euros for THL and 4 million euros for FIOH (N.B. although the amounts are the same as in the research funding reform, these are additional, separate cuts).

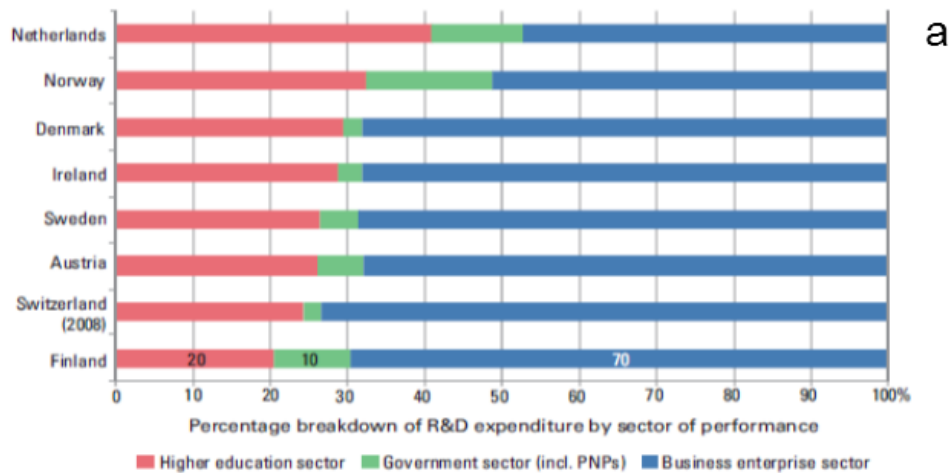
## 4. THL and FIOH in the fields of scientific publishing

### 4.1 THL and FIOH in national and international contexts

Several reports published by the Ministry of Education and Culture Finland (MEC) or the Academy of Finland have recently reviewed the Finnish research and development field as well as the Finnish scientific publication activity and citation impact using either Web of Science (WoS) or Scopus as the source. In many instances, Finnish performance is presented in comparison to some other European countries (MEC 2012, 2013 <sup>2, 3</sup>; Academy of Finland 2012 <sup>4</sup>). In addition, an international comparison of publication activity and citations, with some central features of collaboration and lead authorships, has been presented on the basis of Scopus for Finland for 2007–2011 by SCImago <sup>5, 6</sup> (Scimago 2013, <http://www.scimagojr.com>).

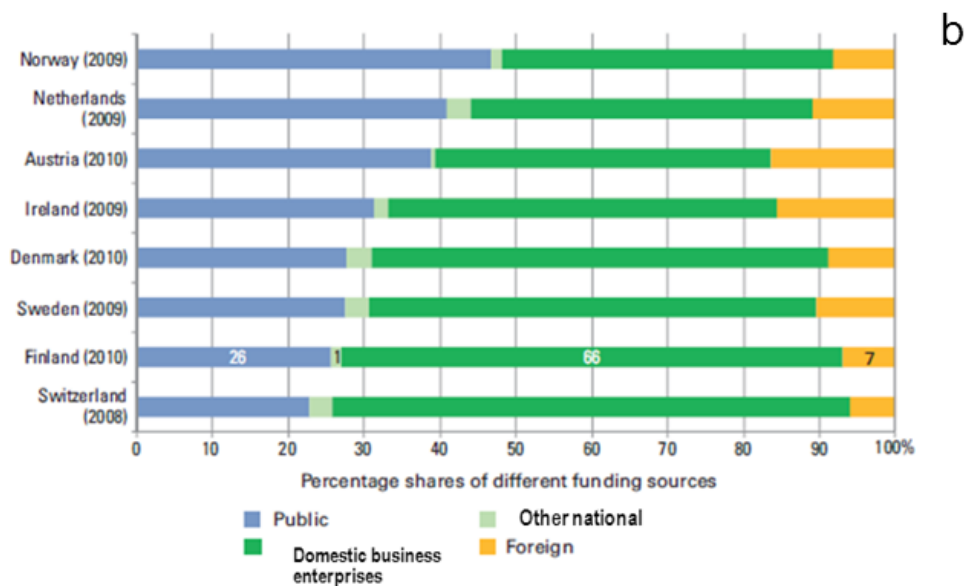
To provide a brief background to the bibliometric data for the National Institute of Health and Welfare (THL in most graphics and tables) and the Finnish Institute of Occupational Health (FIOH or TTL, the Finnish acronym, in graphics and tables), some excerpts from these reviews, including both international and national comparisons, are presented. These background data depict the overall Finnish R&D activities by sector of performance and R&D funding structure (Fig. 1 a, b), the total Finnish scientific publication output by research organisation type (Fig. 2 a) and the relative citation impact in 2003–2010 of Finland, as well as of some other European countries, in relation to the world average level (Fig. 2b).





Source: OECD Research and Development Statistics (RDS), June 2012.

NB: Data for Switzerland from 2008. The countries are listed in the order of the higher education sector's proportion of R&D activities. The higher education sector includes universities, polytechnics and (e.g. in Finnish statistics) university hospitals. The government sector comprises other public organisations that engage in R&D. In Finland, government research institutes account for the bulk of government-sector R&D. In this Figure, the government sector also includes private non-profit organisations (PNPs), which in Switzerland accounted for 1.6% of R&D expenditure and in other countries for 0–0.7%, the Finnish figure in 2010.



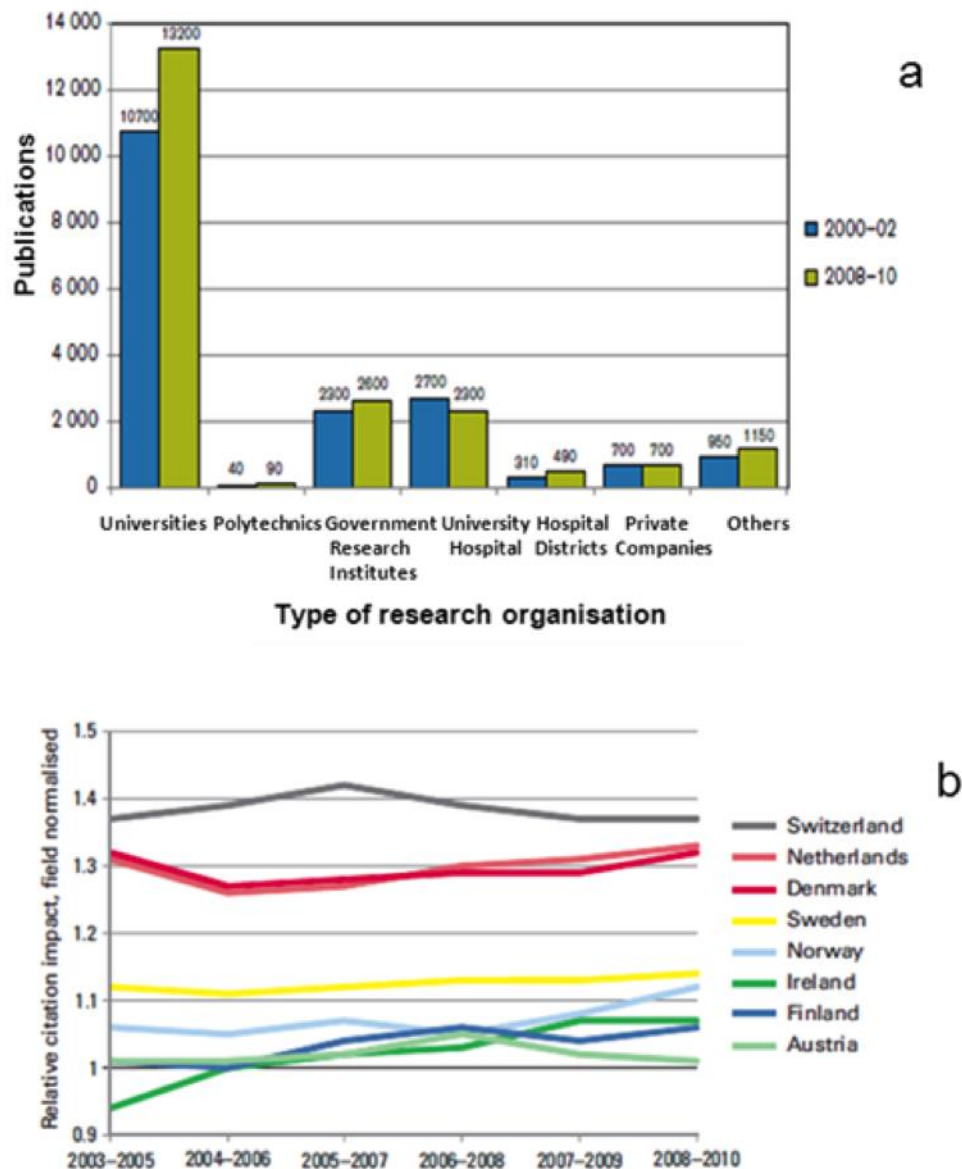
Source: OECD Research and Development Statistics (RDS), June 2012.

NB: The countries are listed in the order of the percentage of public R&D funding. Data for Switzerland from 2008.

**Figure 1a and 1b.** R&D activities in Finland by sector of performance and R&D funding structure in 2009/2010. **a.** R&D activities are shown as the contribution of different sectors as a percentage of national R&D expenditure in 2010. **b.** R&D funding structure as a percentage of different funding sources in 2009/2010. Source: *The State of the Scientific Research in Finland 2012* (Academy of Finland, 2012) <sup>4</sup>.

The Finnish R&D activities indicated by expenditure and the sector (Fig. 1a) show a long-term tradition of placing a large share (10%) of R&D in the governmental sector (also includes private non-profit organisations [PNPs]) rather than in the universities, as is the practice in some selected European countries. In Finland, R&D funding is mainly from public sources (26%) and only a

thin slice (1%) is from other national sources. The funding from foreign sources (mostly EU) also represents a relatively small share (7%) (Fig. 1b) (Academy of Finland 2012 <sup>4</sup>).



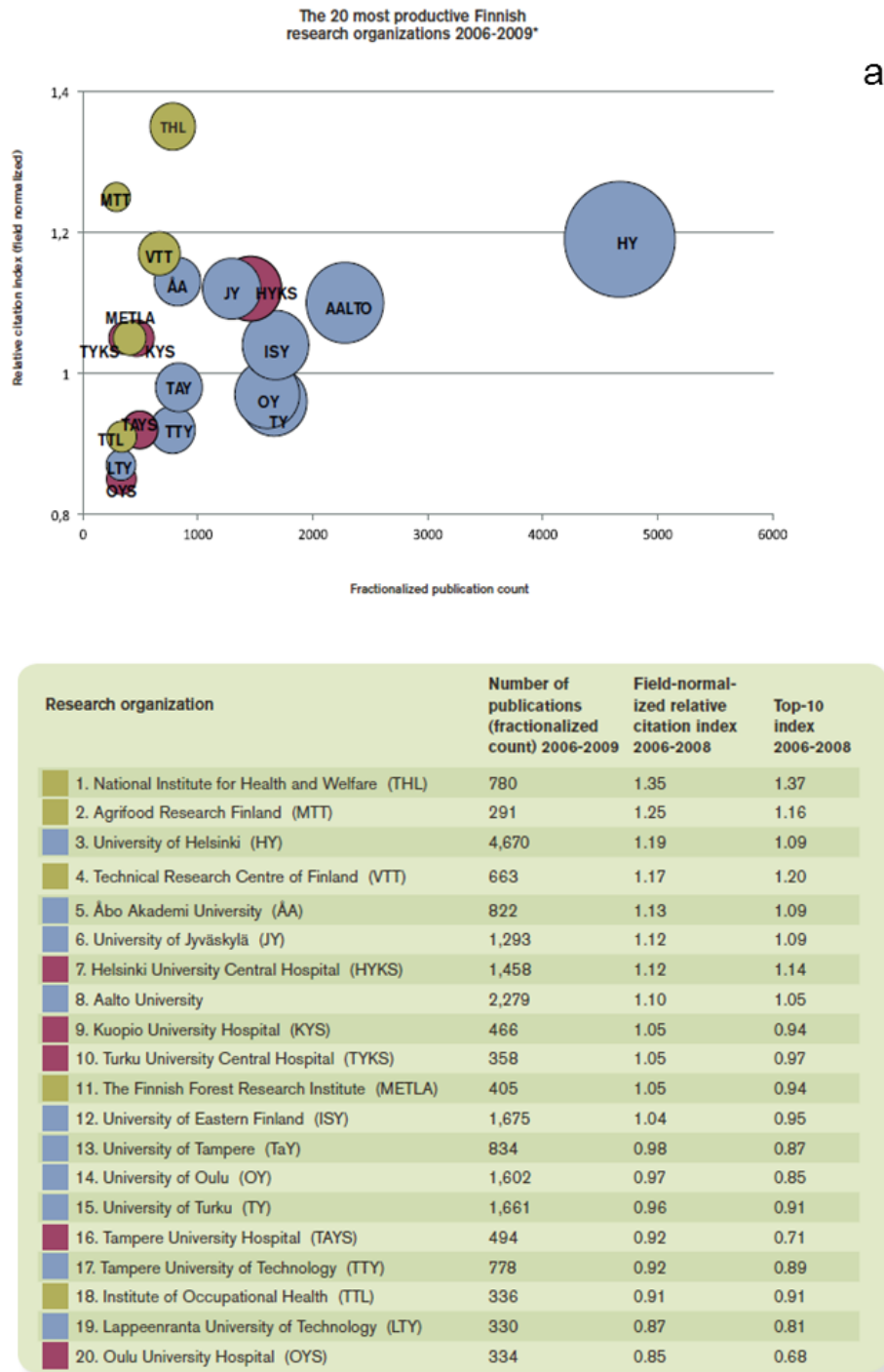
Data source: Thomson Reuters 2012. Bibliometric analyses by Raj Kumar Pan and Santo Fortunato, Aalto University 2012

NB: A country's relative citation impact measures how many citations more or less publications from that country have received in comparison with the world average over a certain period of time.

**Figure 2a and 2b. a.** Numbers of publications (fractionalized) by research organisation type in Finland in 2000–2010 (WoS). From left: universities; polytechnics; state research institutes; university hospitals; hospital districts; enterprises; other. Source: MEC Finland Publications 2013:17 [In Finnish] <sup>2</sup>. **b.** The normalized relative citation impact in 2003–2010 of Finland and some selected European countries. World average level is 1. Source: The State of the Scientific Research in Finland 2012 (Academy of Finland, 2012 <sup>4</sup>).

Of the whole scientific output for Finland, approximately one fifth of the publications are from state research institutes; in absolute numbers 2300 publications in 2000–2002 and 2600 in 2008–2010 (WoS). This total output is comparable to that of university hospitals (Fig. 2a). In comparison to the world level, the relative citation impact of Finnish publications has per-

formed well, being at the world average level since the beginning of the millennium and consistently staying above it since 2004–2006 (Fig. 2b).



**Figure 3a and 3b.** The 20 most productive Finnish research organisations. **a.** Number of publications in 2006–2009 and field normalized citation index in 2006–2008 in the most productive Finnish research organizations (productivity measured as publication counts). **b.** Tabulation of the 20 most productive Finnish research organisations in 2006–2009 ranked by the field normalized citation index for 2006–2008. Source: Report from the Finnish Citation Index Working Group II (MEC Finland Reports, 2012: 18<sup>3</sup>).

In a closer national comparison, the state research institutes are doing very well both in numbers of publications (fractionalized, years 2006–2009) and in the normalized citation index

(2006–2008) (Fig. 3a and b). Among the 20 most productive Finnish research organisations are several state research institutes, including both THL and FIOH (TTL). THL is the leading research organisation of the country, with a higher rank than the largest national university (University of Helsinki), as evaluated by relative citation index (1.35, field normalized, 2006–2008). THL also ranks high in terms of publication numbers (appr. 1000 as fractionalized publication count for 2006–2009) being the leading state research institute in publication production. FIOH (TTL) ranks 18<sup>th</sup> with a relative field normalized citation index of 0.91 and produced 336 publications as a fractionalized publication count during the same periods (Fig. 3a and b).

Finally, in the latest global report by the SCImago Research Group <sup>5, 6</sup> for 2007–2011 (Elsevier Scopus data), THL ranked 11<sup>th</sup> of all Finnish research organisations (CR) and worldwide as the 993<sup>rd</sup> (WR) with 3371 publication (Fig. 4).

FIOH (TTL) with 1239 publications was ranked in this report as the 18<sup>th</sup> national research organisation (CR) and globally held the rank of 1930 (WR) (Fig. 4).

For THL, the SCImago analysis in 2013 also showed the following key features:

- The normalized citation index (NI) of THL was 2.13. Articles of THL authors were cited more than twice as often as articles in the respective scientific field (NI; world level = 1).
- 53% of THL's research was carried out in collaboration with international partners (%IC).
- 76% of THL's scientific publications appeared in what are considered the most influential journals (top 25% of journals ranked by SJR Indicator), this figure being the second highest in Finland (%Q1).
- 25% of the articles belonged to the top 10% of the most cited papers in their respective scientific fields (%Exc).
- 33% of THL publications had a THL researcher as the lead author (%Lead).

Similarly, FIOH was characterized in the SCImago report as follows:

- The normalized citation index of FIOH was 1.59 (NI). Publications by FIOH authors were cited more than 1.5 times the world average in the respective research field (world level = 1).
- 45% of published FIOH research was carried out through international collaborations (%IC).
- 62% of FIOH scientific publications appeared in the most influential journals (top 25% of journals ranked by SJR Indicator).
- 5.8% of FIOH publications belonged to the top 10% of the most cited papers in their respective fields (%Exc).
- 43% of FIOH publications had a FIOH researcher as the lead author (%Lead).

WR	RR	CR	Organization	Sector	Country	Region	Q	% IC	NI	% Q1	Spec	% Exc	% Lead	% EwL											
155	↓	43	↓	1	↓	University of Helsinki	HE	FIN	WE	17440	↑	52.79	↑	1.61	↑	64.99	↑	0.48	↓	19.07	↑	50.09	↓	7.94	↓
356	↑	122	↑	2	↓	Aalto University	HE	FIN	WE	9662	↑	44.37	↑	1.38	↑	40.67	↑	0.64	↓	16.46	↓	62.86	↓	8.68	↓
510	↓	182	↓	3	↓	University of Turku	HE	FIN	WE	7000	↑	48.87	↑	1.34	↑	57.79	↑	0.49	↓	14.93	↓	49.9	↓	6.06	↓
523	↓	188	↑	4	↓	University of Oulu	HE	FIN	WE	6796	↑	45.16	↑	1.44	↑	48.4	↑	0.52	↓	14.5	↓	54.72	↓	5.36	↓
580	↓	208	↑	5	↓	University of Eastern Finland	HE	FIN	WE	6225	↑	41.56	↑	1.46	↑	58.22	↑	0.52	↓	16.9	↓	52.37	↓	6.85	↓
691	↓	245	↓	6	↓	Helsinki University Central Hospital	HL	FIN	WE	5097	↑	42.08	↑	2.11	↑	71.51	↑	0.79	↓	22.17	↑	36.55	↓	5.92	↓
758	↓	266	↑	7	↓	Tampere University of Technology	HE	FIN	WE	4602	↑	36.42	↑	1.2	↑	27.01	↑	0.73	↓	13.97	↑	68.04	↓	6.95	↓
794	↓	278	↑	8	↓	University of Jyväskylä	HE	FIN	WE	4406	↑	47.09	↑	1.36	↑	51.16	↑	0.62	↓	15.08	↓	54.97	↑	7.51	↓
868	↓	307	↑	9	↓	VTT Technical Research Centre of Finland	OT	FIN	WE	3967	↑	39.4	↑	1.21	↑	35.27	↑	0.68	↓	14.27	↓	55.89	↓	5.98	↓
878	↓	312	↑	10	↓	University of Tampere	HE	FIN	WE	3921	↑	35.78	↑	1.49	↓	55.14	↑	0.63	↓	16.75	↓	46.29	↓	6.44	↓
993	↓	345	↑	11	↓	National Institute for Health and Welfare	HL	FIN	WE	3371	↑	52.74	↑	2.13	↑	75.67	↑	0.8	↓	24.84	↓	32.54	↓	5.74	↓
1156	↓	398	↑	12	↓	Abo Academy University	HE	FIN	WE	2760	↑	48.33	↑	1.28	↑	52.86	↑	0.59	↓	14.23	↓	56.56	↑	6.66	↓
1233	↓	430	↓	13	↓	Tampere University Hospital	HL	FIN	WE	2521	↑	33.72	↑	1.76	↑	64.97	↑	0.77	↓	19.15	↑	30.23	↑	4.15	↑
1458	↓	522	↑	14	↓	Kuopio University Hospital	HL	FIN	WE	1965	↑	32.21	↑	1.87	↑	66.56	↑	0.79	↓	20.79	↑	31.55	↓	4.91	↓
1604	↑	576	↑	15	↓	Turku University Hospital	HL	FIN	WE	1707	↑	35.44	↑	1.83	↑	66.26	↑	0.78	↓	18.89	↑	36.26	↓	6.87	↑
1649	↓	594	↑	16	↓	Lappeenranta University of Technology	HE	FIN	WE	1632	↑	35.97	↑	1.41	↑	33.88	↑	0.79	↓	15.56	↑	65.99	↓	5.05	↓
1861	↓	681	↓	17	↓	Oulu University Hospital	HL	FIN	WE	1327	↑	32.25	↑	1.68	↑	65.03	↑	0.82	↓	17.24	↑	36.02	↓	4.42	↑
1930	↓	711	↓	18	↓	Finnish Institute Occupational Health	HL	FIN	WE	1239	↓	44.71	↑	1.59	↑	61.66	↑	0.85	↓	18.14	↑	43.02	↓	5.82	↓
1955	↓	726	↓	19	↓	Finnish Meteorological Institute	GO	FIN	WE	1212	↑	68.23	↓	1.49	↑	68.56	↑	0.94	↓	18.66	↓	36.06	↓	3.75	↓
2017	↓	760	↓	20	↓	Finnish Forest Research Institute	GO	FIN	WE	1128	↑	32.98	↑	1.13	↑	63.83	↑	0.93	↓	12.87	↑	43.79	↓	4.11	↑
2023	↓	764	↓	21	↓	Helsinki Institute of Physics	GO	FIN	WE	1122	↑	79.06	↓	2.35	↑	66.31	↑	0.97	↓	29.6	↑	34.85	↓	7.94	↑
2330	↓	923	↓	22	↓	MTT Agrifood Research Finland	GO	FIN	WE	768	↑	37.89	↑	1.3	↓	53.52	↑	0.88	↓	15.48	↓	52.47	↓	6.75	↓
2412	↓	976	↓	23	↓	Finnish Environment Institute	GO	FIN	WE	678	↑	41.74	↑	1.43	↓	61.95	↑	0.91	↓	16.49	↓	42.04	↓	5.65	↑
2621	↓	1114	↑	24	↓	Folkhalsan	GO	FIN	WE	451	↑	68.96	↓	2.73	↓	81.6	↑	0.9	↓	24.44	↓	17.96	↓	2	↓

WR/RR/CR World/Region/Country Rank

\* Institution with subordinates | sub Subordinate institution

Sectors: GO Government | HE Higher Education | HL Health | PR Private | OT Others

Regions: AF Africa | AS Asia | EE Eastern Europe | LA Latin America | ME Middle East | NA Northern America | OC Oceania | WE Western Europe | MU Multinational

**Figure 4.** SIR Global Finland 2013, rank by publication output 2007–2011 (2). WR – World rank by number of publications; %IC – Proportion of international collaborative publications; %Q1 – Proportion of publications in top quality journals of the field; NI – Normalized citation index, 1 = world average; %Exc – Percentage of publications among the top cited 10% ; %Lead – Proportion of publications with the leading author form the research organisation indicated.

#### 4.2 THL and FIOH's scientific publications and citation in international peer review journals – bibliometric analysis for 2009–2012

Bibliometric analysis was carried out by the Bibliometric Services of the Central Medical Library of the University of Helsinki and the Helsinki University Central Hospital (Terkko). It covered publications in international peer-reviewed scientific journals (articles, reviews and letters) in 2009–2012, as identified in the Web of Science (WoS) (Appendix 1). During this period, the total output from THL was 2929 publications and that from TTL was 868 publications (Table 1)<sup>1</sup>.

The bibliometric measures, with more than 36000 citations in total (on average 13.22 citations per article) for publications from THL, and over 8600 citations ( on average 10.91 per item) for articles from FIOH, indicate that the research published by the institutes is also actively received by the international scientific community (Table 1; self-citations excluded). Further, the median impact factor (IF) for the journals in which the researchers published was well above IF 3 (3.4) for THL and IF 3.07 for FIOH (Table 1). The high citation impact of THL



and FIOH was also reflected in the H-Indexes <sup>2</sup>and G-Indexes of the institutes. In particular these indexes were at a high level for THL, while those for FIOH were approximately half of the THL level (Table 1).

**Table 1.** *Numbers of scientific publications in international peer-reviewed journals, median impact factors, total and average citations, and H and G Indices for THL and FIOH 2009–2012 (WoS).*

Institute	No. publications	Median IF <sup>1</sup>	Sum citations <sup>2</sup>	Average citation per item	H-Index <sup>3</sup> (2009–2013)	G-Index <sup>4</sup> (2009–2013)
THL	2929	3.392	36206	13.22	72	127
FIOH	868	3.070	8687	10.91	37	71

<sup>1</sup>For 2871 publications from THL and 846 publications from FIOH. <sup>2</sup>2929 publications for THL and 848 for FIOH. Sum of times cited without self-citations.

<sup>3</sup>H-index: A scientist (here: institute) has index  $h$ , if  $h$  of his/her ( $N$ ) papers have at least  $h$  citations each, and the other ( $N-h$ ) papers have no more than  $h$  citations each. Hirsch, 2005. <sup>4</sup>G-index: The highest number ( $g$ ) of papers that in total received  $g^2$  or more citations. Egghe, 2006.

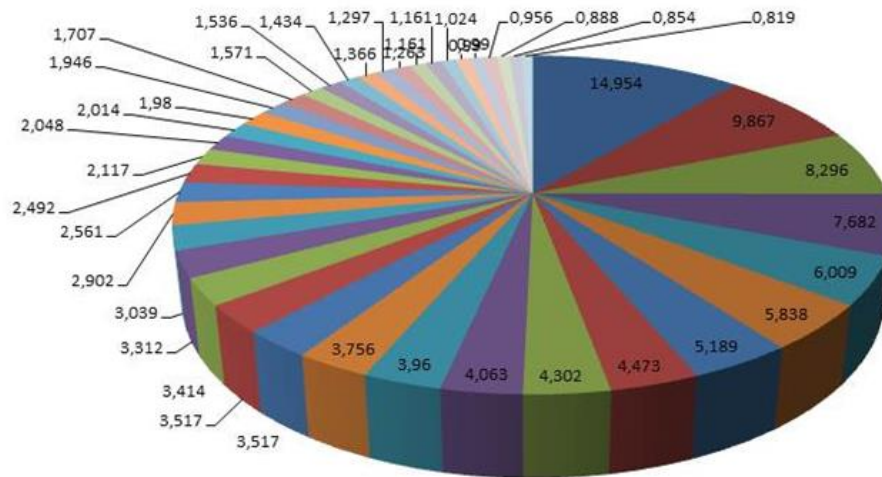
The scientific production was distributed into a fairly large number of research areas judged by the research fields with which the scientific journals identified themselves (typically multiple areas indicated for a single journal), reflecting the multidisciplinary nature of the two institutes (Fig. 5a for THL and Fig. 5b for FIOH).

For both institutes, scientific publications were most frequently published in journals within a widespread research area of public/environmental/occupational health, with 15% of publication output for THL and 33% for FIOH (Fig. 5a and 5b). THL published the second most frequently in journals of psychiatry (9.9%), genetics (8.3%), endocrinology & metabolism (7.7%) and nutrition (6.0%). FIOH published the second most frequently in journals of clinical neurology (6.6%), toxicology (6.2%), neurosciences (5.4%), and environmental sciences (5.0%). Some of the most frequent topic areas, such as clinical neurology for FIOH, may not open up as one of the assumingly main research areas. The journals behind this overall topic area include such journals as the Journal of Sleep Research, the European Journal of Pain, the Journal of Affective Disorders, Sleep, Spine, Sleep Medicine, the European Journal of Pain, to mention a few of the most frequent.

<sup>2</sup> The number of scientific publications indicated here for FIOH as based on a Web of Science search 2009–2012 is not directly comparable to the numbers given in the previous bibliometric analysis (2004–2008) of FIOH, performed as part of the international evaluation carried out in 2009. The current analysis covers articles, letters and reviews, whereas the 2009 analysis included all publications (regardless of the type) identified in the WoS (or Scopus) search.

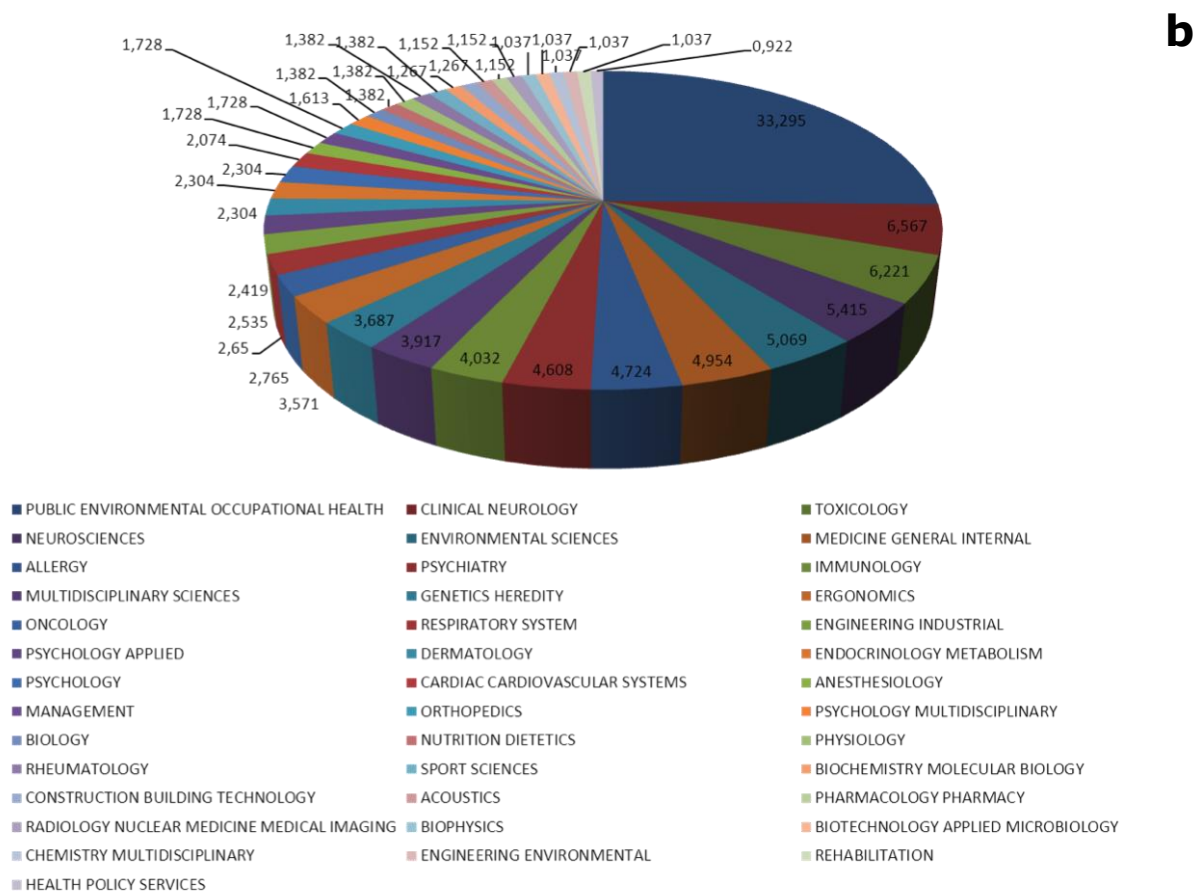
THL Research areas in 2009-2012 . 40 most common(%)

a



- |  |                                   |                                      |
|--|-----------------------------------|--------------------------------------|
| ■ PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH | ■ PSYCHIATRY                      | ■ GENETICS HEREDITY                  |
| ■ ENDOCRINOLOGY METABOLISM                 | ■ IMMUNOLOGY                      | ■ INFECTIOUS DISEASES                |
| ■ NUTRITION DIETETICS                      | ■ CLINICAL NEUROLOGY              | ■ MICROBIOLOGY                       |
| ■ BIOCHEMISTRY MOLECULAR BIOLOGY           | ■ MEDICINE GENERAL INTERNAL       | ■ ONCOLOGY                           |
| ■ NEUROSCIENCES                            | ■ PERIPHERAL VASCULAR DISEASE     | ■ MULTIDISCIPLINARY SCIENCES         |
| ■ OBSTETRICS GYNECOLOGY                    | ■ PEDIATRICS                      | ■ SUBSTANCE ABUSE                    |
| ■ ENVIRONMENTAL SCIENCES                   | ■ CARDIAC CARDIOVASCULAR SYSTEMS  | ■ TOXICOLOGY                         |
| ■ HEALTH CARE SCIENCES SERVICES            | ■ PHARMACOLOGY PHARMACY           | ■ GERIATRICS GERONTOLOGY             |
| ■ VIROLOGY                                 | ■ DENTISTRY ORAL SURGERY MEDICINE | ■ PSYCHOLOGY CLINICAL                |
| ■ MEDICINE RESEARCH EXPERIMENTAL           | ■ PSYCHOLOGY                      | ■ BIOTECHNOLOGY APPLIED MICROBIOLOGY |
| ■ ALLERGY                                  | ■ HEALTH POLICY SERVICES          | ■ CELL BIOLOGY                       |
| ■ GERONTOLOGY                              | ■ FOOD SCIENCE TECHNOLOGY         | ■ BEHAVIORAL SCIENCES                |
| ■ RESPIRATORY SYSTEM                       | ■ NURSING                         | ■ ORTHOPEDICS                        |
| ■ PSYCHOLOGY MULTIDISCIPLINARY             | ■ HEMATOLOGY                      |                                      |

### FIOH Research areas in 2009-2012. 40 most common (%)



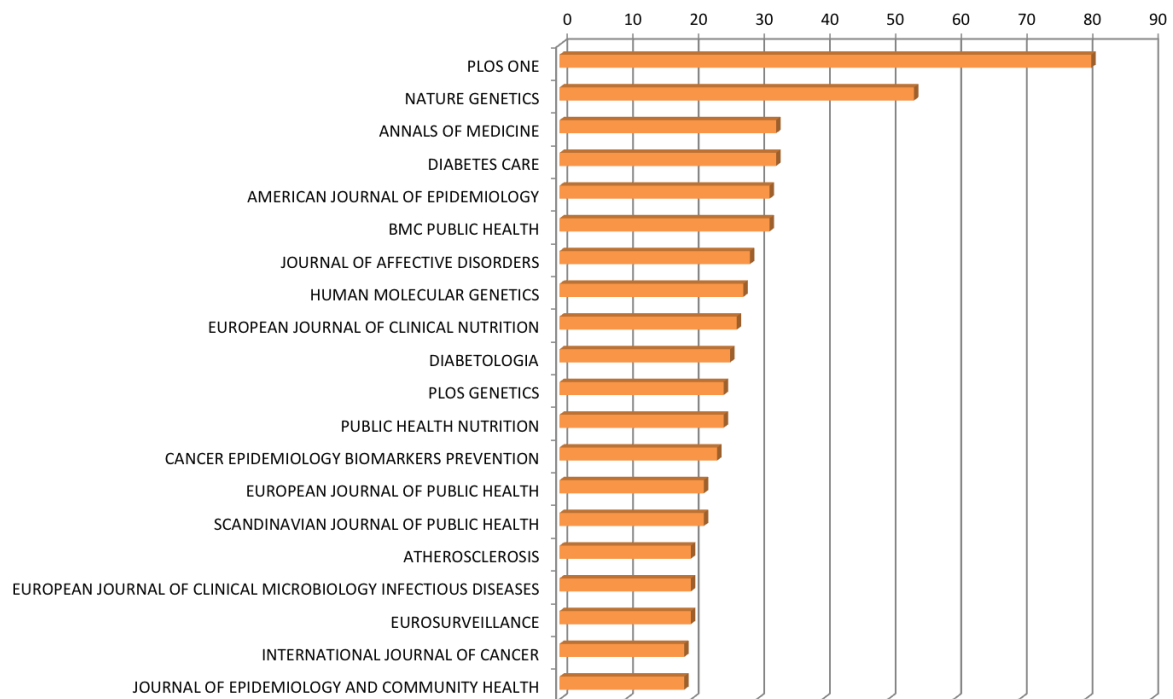
**Figure 5a and 5b** Distribution (%) of publications (2009-2012) by research area category of the journal. **a** for THL, **b** for FIOH. The breakdown indicates the areas of the journals in which the THL and FIOH researchers most frequently published and covers 40% of the publications. Data from WoS.

To illustrate the publication output of the two institutes, publication counts for 20 journals with the highest numbers of publications in 2009–2012 are listed in Fig. 6a and 6b.

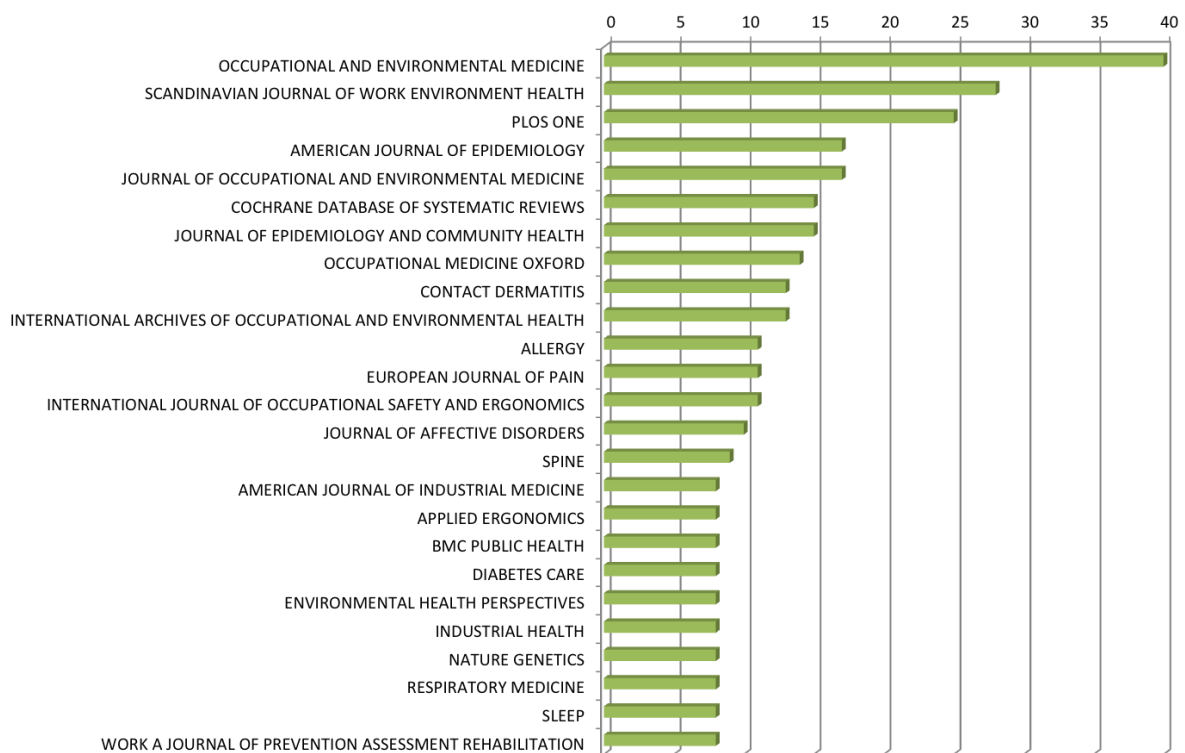
For THL, the top five journals with the highest publication counts were PLoS One (IF 3.73; year 2012 release), Nature Genetics (IF 35.2), Annals of Medicine (IF 5.09), Diabetes Care (7.74) and the American Journal of Epidemiology (IF 4.78). For FIOH, the top five journals were Occupational and Environmental Medicine (IF 3.22), the Scandinavian Journal of Work Environmental Health (IF 3.78), PLoS One (IF 3.73), the American Journal of Epidemiology (IF 4.78), and the Journal of Occupational and Environmental Medicine (IF 1.85). The different spectra of the most popular journals reflect the different foci of research in THL and FIOH. The journals that fall under the top five for both institutes represent scientific journals that consider good quality papers from various research areas such as PLoS One and Am J Epidemiology. The fact that Nature Genetics, with an impact factor of 35.2, ranks so high for THL is exceptional, and reflects the outstanding level of genomic studies at THL, which are based on a long research tradition and fruitful collaboration with universities and research institutes in Finland and abroad.



### THL articles in different journals in 2009-2012 20 most popular journals

**a**

### FIOH articles in different journals in 2009-2012 25 most popular journals

**b**

**Figure 6a and 6b** Scientific articles published in 20 (**a** for THL) or 25 (**b** for FIOH) of the most popular international peer-review journals (representing about 65% of total output in 2009–2012 (data from WoS).

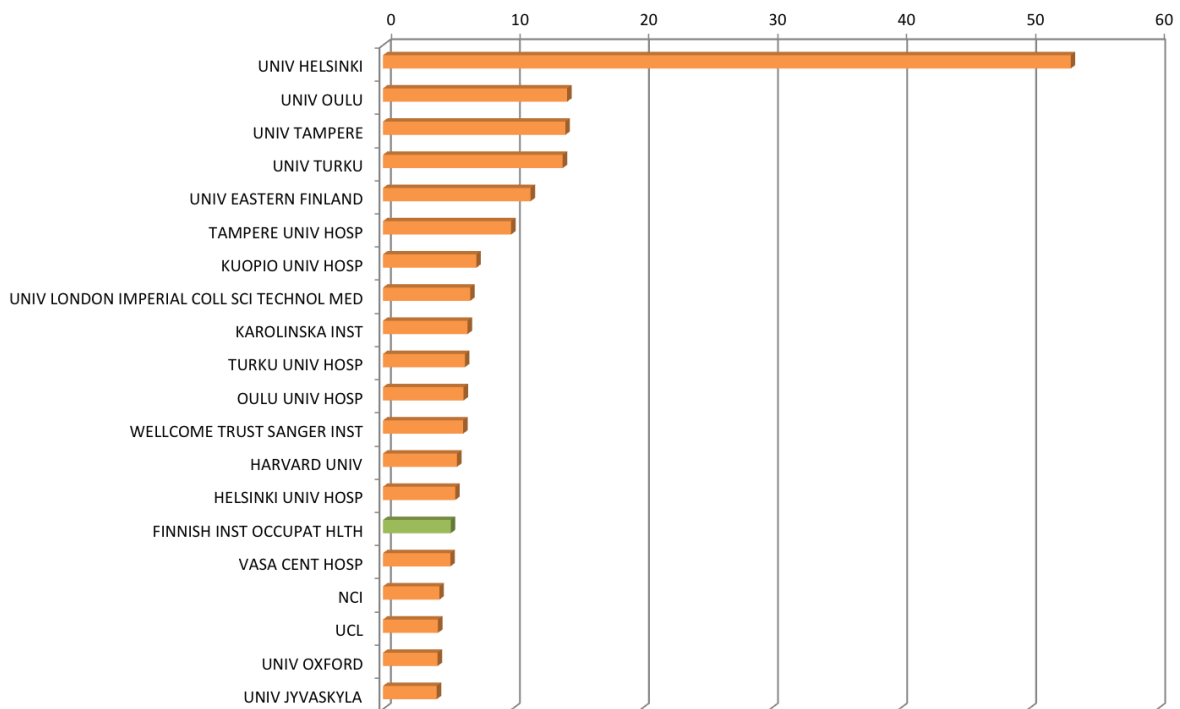
As regards the publication profiles of the institutes, it is also worth looking at how the articles published by the institutes were received and in which journals the top cited papers have been published. The list of the 20 most cited articles in 2009–2012, published by THL or FIOH researchers, indicates that high quality research, often based on representative study populations with rich data and biosamples available, is well represented (Table 2). This is in particular reflected in top citations for THL but partially also in the citation profile for FIOH. For both institutes, these top cited articles also reflect collaborative research, which in FIOH's case includes collaboration with THL on the study populations mentioned.

**Table 2.** *Distribution of the 20 most cited articles (2009-2012) by scientific journal for THL and FIOH.*

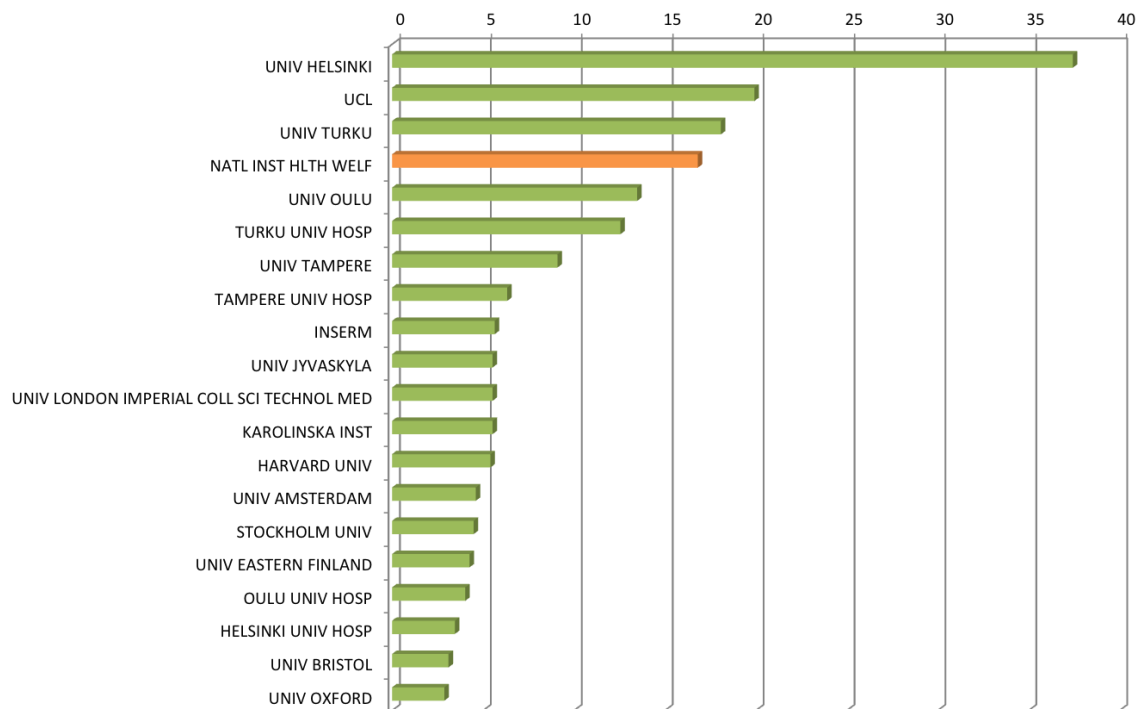
THL		FIOH	
Journal	No. top cited articles	Journal	No. top cited articles
Nature Genetics	12	Nature Genetics	7
Nature	5	Nature	2
Lancet	2	Lancet	2
JAMA	1	PLoS One	2
		Toxicology	2
		JAMA	1
		Mutagenesis	1
		PNAS	1
		Human Exp Toxicol	1
		Psychological Medicine	1

Finally, to provide an overview of the research collaboration of the institutes, the 20 most frequently collaborating research organisations in publications are presented for THL and FIOH (Fig. 7a and 7b).

THL collaboration partners (%) in articles 2009-2012  
(20 most common)

**a**

TTL collaboration partners (%) in articles 2009-2012  
(20 most common)

**b**

**Figure 7a and 7b** The most frequent collaboration partners (national and international) in publications in 2009–2012 (WoS). **a** for THL, **b** for FIOH.

For THL, by far the most frequent collaborating organisation is the University of Helsinki (UH); over 50% of its publications were shared with UH in 2009–2012. Others include the University of Oulu (UO), the University of Tampere (UTa) and the University of Turku (UT), all collaborators in about 13–15% of THL publications, followed by the University of Eastern Finland (UEF) a collaborator in about 11%. For THL, FIOH ranks 15<sup>th</sup> in the list of collaborating research organisation, with around 5% of THL publications published together with FIOH (Fig. 7a).

For FIOH, similar to THL, the ranking of FIOH publications published in collaboration indicates UH as the most frequent collaborating research organisation (approximately 37% of FIOH publications). The next most frequent collaborator is the University College of London (UCL), UK; close to 20% of FIOH publications were shared with UCL, followed by UT, a collaborator in some 17% of FIOH publications. THL ranks as the 4<sup>th</sup> most frequent collaborator with approximately 16% of FIOH publications published in collaboration. UO ranks as the 5<sup>th</sup> most frequent collaborating partner, with about 13% of FIOH publications being jointly written with this university (Fig. 7b)

#### **4.3 Scientific publications, other reporting, and dissemination of information via the internet - overview**

Researchers from THL and FIOH actively publish not only in international and national peer-reviewed scientific journals, but also widely in professional journals and general newspapers and magazines. Both institutes also act as publishers of journals, professional magazines and books themselves; these are typically available in print, as open publications on the respective institutional websites or only in e-format.

In 2009–2012, THL published 4510 publications according to its publication registry. Of these, 65% were published in international peer reviewed scientific journals, and 6% in domestic peer reviewed journals. A total of 141 of these were dissertations.

The THL report series issued 629 publications, 14% of the total, with over 300,000 downloads a year.

([https://www.julkari.fi/simplestats/all?community\\_id=4&start\\_time=201212&stop\\_time=201311](https://www.julkari.fi/simplestats/all?community_id=4&start_time=201212&stop_time=201311)).

THL also publishes two journals. The journal Tesso (<http://www.tesso.fi/>) is for professionals and decision-makers in the health and social sector, with a readership of 100,000. Yhteiskuntapolitiikka

([http://www.thl.fi/fi\\_FI/web/fi/ajankohtaista/lehdet/yhteiskuntapolitiikka](http://www.thl.fi/fi_FI/web/fi/ajankohtaista/lehdet/yhteiskuntapolitiikka)) is a scientific journal in welfare research, published in Finnish with over 100,000 downloaded articles a year. ([https://www.julkari.fi/simplestats/all?community\\_id=4&start\\_time=201212&stop\\_time=201311](https://www.julkari.fi/simplestats/all?community_id=4&start_time=201212&stop_time=201311)). The journal was founded in 1936 under the title Alkoholipolitiikka (Alcohol Policy) by the State Alcohol Monopoly. It was then transferred to STAKES and subsequently to THL in 1998. The journal Yhteiskuntapolitiikka (Social Policies) is one of the very few leading Finnish-language journals in the field of social sciences. It was classified as “leading” in a three-step classification of publication channels, launched by the Federation of Finnish Learned Societies in 2011 (the levels being basic, leading and top; all categories include mostly international journals, and the “leading level” is the highest category available for a Finnish-language journal outside the field of Fenno-Ugric linguistics). It should be noted that publishing in national languages has a particular importance in the fields of social and political sciences, as research issues in these fields are mostly national and local by nature.

The FIOH participates in the publishing of the Scandinavian Journal of Work, Environment & Health (SJWEH) as a partner in the NOROSH society, which is a not-for-profit society that aims to strengthen Nordic and international cooperation in the field of occupational safety and

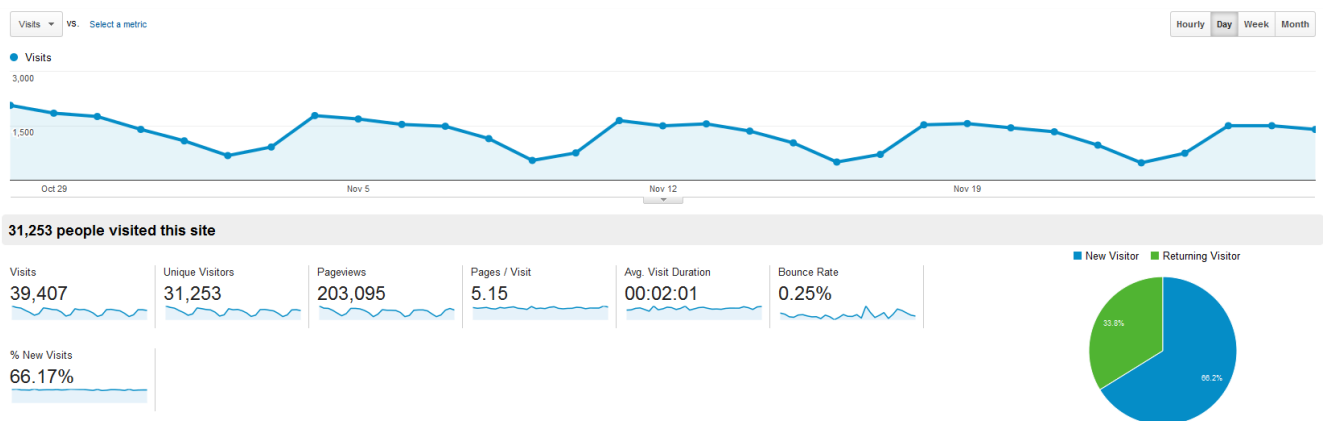
health. The SJWEH is an international scientific occupational safety and health periodical. It has been published in English since 1 January 1975. The SJWEH is in the top 11% of the scientific edition of Public, Environmental and Occupational Health journals in the 2012 Journal Citation Report.

Since March 2012, THL has run an institutional repository of its JULKARI publications (<https://www.julkari.fi>), from which publication series and journals published by THL are openly available. The number of document downloads has steadily risen (Figure 8), and the service has become more well known among the public.

## Monthly download statistics

Parent hierarchy: [The entire DSpace /](#)

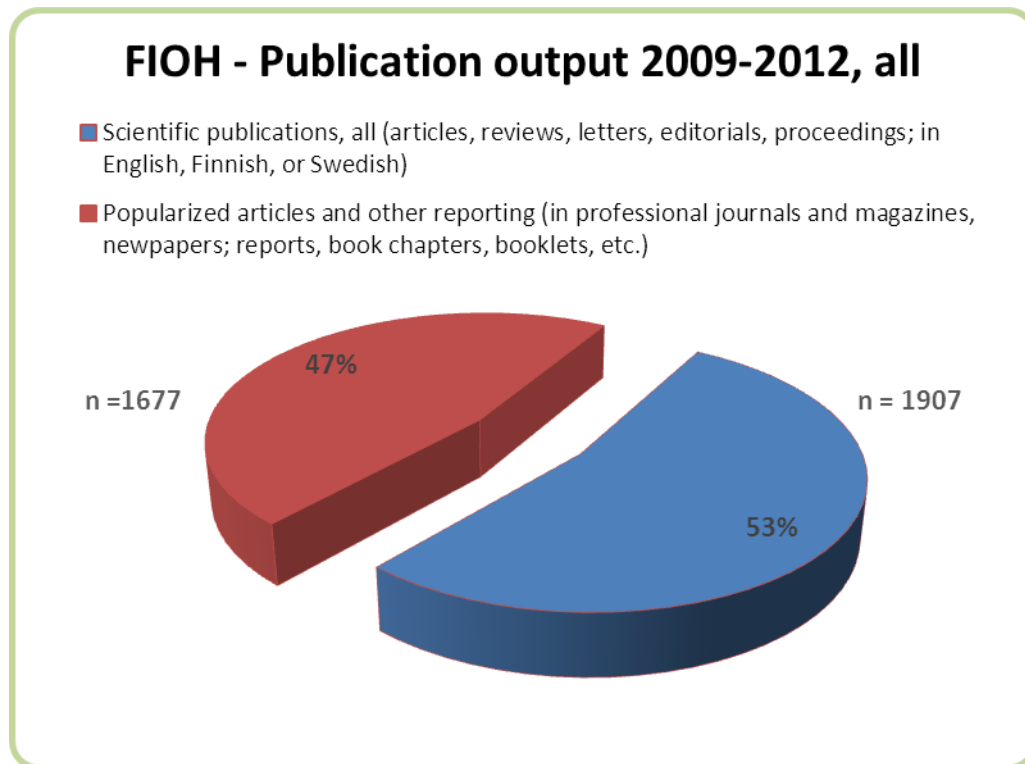
	12 / 2012	1 / 2013	2 / 2013	3 / 2013	4 / 2013	5 / 2013	6 / 2013	7 / 2013	8 / 2013	9 / 2013	10 / 2013	11 / 2013	Total
<b>THL</b> (8703 items, 2712 bitstreams, 2206 megabytes)	16893	29078	35062	41846	42935	37665	30211	21871	34096	50273	60302	8871	<b>409103</b>
<a href="#">Artikkelit</a> (5903 items, 10 bitstreams, 7 megabytes)	66	93	55	57	64	83	48	27	81	59	107	13	<b>753</b>
<a href="#">Kirjat</a> (960 items, 886 bitstreams, 1642 megabytes)	13447	22422	26256	26578	30480	28081	21892	15725	25407	38195	47238	6669	<b>302390</b>
<a href="#">Yhteiskuntapolitiikka</a> (1840 items, 1816 bitstreams, 556 megabytes)	3380	6563	8751	15211	12391	9501	8271	6119	8608	12019	12957	2189	<b>105960</b>



**Figure 8.** Download statistics for THL publications and journals available from the THL publication repository JULKARI.

As the service is new, the proportion of new visitors to the repository is still over 60% of the total 32,000 monthly visitors.

For FIOH, the distribution of the overall publication activity in 2009–2012 is presented by publication type in Fig. 9. FIOH researchers achieved 3584 publications in total during 2009–2012. Of the total FIOH publication output, 53% were in scientific journals, both international and national, whereas 47% represented popularized publications, including, for example, publications in professional journals, books or booklets, other reporting, and newspaper articles for general audience, published typically in Finnish, Swedish (some 1-2%) or English. The total output of popularized articles in professional journals or magazines, as well as other reporting in Finnish, was about 1520 publications. During the evaluation period, approximately 25 PhD theses were also completed by FIOH researchers.



**Figure 9.** Distribution of FIOH publication output (all) by publication type. Scientific publications in international journals, taken from WoS and other data from FIOH's publication database (Julia 2010–2012 and TAVI 2009) **a.** Total number of all types of scientific publications in international journals in 2009–2012 for FIOH as identified in WoS ( $n = 1001$ ).

FIOH publishes two magazine-type journals in Finnish, targeted in particular towards workplaces and professionals in occupational safety and health (*Työ Terveys Turvallisuus* and *Työpiste*). In addition, FIOH, like THL, acts as a book publisher with some 30 new titles in print and 21 in e-version (pdf) available on the FIOH website ([www.ttl.fi](http://www.ttl.fi)) (Table 3). FIOH also publishes a research report series called *Työ ja Ihminen* or *People and Work* (in English) and another series primarily covering research funding reports (*Tietoa työstä – tutkimusraporttisarja*; in Finnish), all also available on the FIOH website. The total number of books published by FIOH, currently (Oct 2013) available in e-versions (pdfs) on the website, is 141 (<http://www.ttl.fi>).

**Table 3.** Activity of FIOH as a publisher in 2012/2013. Magazines and books published in print and as e-versions are indicated. Visits to the FIOH website are also indicated. The number of PhD thesis with FIOH as the publisher was 12 in 2009–2012 (included in the numbers indicated).

Activity	No of Readers/Visits (Visitors)/ Copies sold/ New titles 2012/2013	Period measured
<b>Magazines published by FIOH</b> <b>Työ Terveys Turvallisuus (in Finnish)</b> <ul style="list-style-type: none"> <li>• in print</li> <li>• e-version on the FIOH website</li> </ul> <b>Työpiste, e-Magazine (in Finnish) on the FIOH website</b>	158000 <sup>1</sup> 27304 153000 (125000)	2013 <sup>1</sup> Jan – Sept 2013 Jan – Sept 2013
<b>Books published by FIOH</b> <b>Printed copies sold</b>	28910 17767	2012 Jan – Sept 2013
<b>New book titles</b> <ul style="list-style-type: none"> <li>• in print</li> <li>• e-publications (pdfs) on the FIOH website</li> </ul>	30 16 21	2012 2012 Jan – Sept 2013
<b>Research reporting series<sup>2</sup></b>	28	2012
<b>FIOH webpages (www.ttl.fi)</b> <b>Visits</b> <ul style="list-style-type: none"> <li>• total</li> <li>• average per day</li> </ul>	497713 2048	Jan – Sept 2013 Jan – Sept 2013

<sup>1</sup> According to national media survey, 2013. <sup>2</sup> Tietoa työstä -tutkimusraporttisarja.

#### 4.4 Conclusions of the bibliometric analysis

Both institutes actively report their research findings in international and national scientific journals but they also publish widely in other publication forums such as professional magazines, books, booklets, and general newspapers and magazines using the two national languages (mainly Finnish). Overall, the shares of scientific publications (67%, scientific publications in peer-reviewed international journals for THL; 53%, all scientific publications for FIOH) compared to other types of publications indicate somewhat different profiles. However, the big picture is relatively similar, demonstrating that emphasis is placed on the dissemination of information via multiple channels, including open access to e-versions, and on increasing the use of websites for launching various types of information.

Both institutes publish in high quality scientific journals and the published work is frequently cited by the international scientific community. For THL, these figures are clearly at a level met by many world leading research organisations. This demonstrates the high quality of the knowledge capital that the institutes possess, exploitable in all their activities.

FIOH is characterized by steady publishing of professional or popularized publications along with scientific publications in a ratio of almost 50%-50% (dissemination of information via the internet not taken into account). FIOH is ranked among the 20 most productive Finnish research organisations and has a relative citation index (field normalized) of 1.59 as indicated by SCImago. FIOH researchers publish in high quality journals, with a median impact factor of 3.07. FIOH is active in publishing in national and international collaboration; this includes regular, well-established collaboration with THL. Collaborative research reporting with THL is typically based on large population studies and their respective comprehensive datasets, many of which are initiated and conducted in collaboration (e.g. Health 2000 Study and Health 2011 Study).

THL and FIOH are important not only for their international scientific merits but for their impact on national policy-making, the development of systems and operations, and their re-

search field. Much of the research that is relevant from these perspectives concerns national and local issues. A scientific approach is needed here, too, and publishing in national languages is a central component if research-based expertise is to have a real impact on the main task of expert organizations (such as THL and FIOH), that is, to transmit the best available knowledge to the processes of decision-making and policy development. Therefore, the publishing activities of THL and FIOH in our national languages are of the utmost importance, and are often more appreciated than international scientific publications by the funders of THL and FIOH.

The two institutes work in extensive collaboration with both Finnish and international universities and research institutions. We can estimate that at least one out of four research projects at THL and FIOH have partners from other Finnish universities and research institutions. Respectively, up to 10% of the projects have international partners. International funding is about 15% of the total research funding both at THL and FIOH (20–25 % of external R&D funding for FIOH), and this often means participation in international research projects and consortia. There are also some examples of joint infrastructure, and of deeper symbiotic collaboration at some universities. The most visible example of this is the FIMM (the Finnish Institute of Molecular Medicine) collaboration between THL and the University of Helsinki. In addition, the institutes and universities also share some research and teaching posts, many on a part-time principle. At THL, the number of such posts is 10 to 15 (out of a total staff of 1300); apart from that there are more than 50 adjunct professorships for THL. At FIOH, the respective figure is 7 professorships and 40 adjunct professorships (out of 800).

The SOTERKO network (introduced in Chapter 3) has in recent years further fertilized the national collaboration between research institutions and universities in Finland.

This extensive collaboration should not be understood as overlapping functions or overlapping competence; on the contrary. There are two driving forces for the collaboration. Combining competences adds to the efficacy of the project groups in solving the various R&D issues of various contexts. No R&D organization can afford to maintain high quality competence in all the fields the specific contexts need. The other driving force is the exploitation of data resources. THL and FIOH maintain large follow-up data resources that enable world-wide unique research settings and research questions. The majority of the collaboration between THL and FIOH is in exploiting these data resources. Very importantly, in Finland, as in other Nordic countries, register data have been central for research on health and welfare. Issues of privacy and future EU regulation on data protection may have a strong influence on the prospects for continuing register-based research in its present extent.

The recent development of the national R&D field and other political decisions mean a serious cut in basic funding for THL and FIOH, from 2014 onwards. Although a significant part of funding comes from sources other than the state budget, basic governmental funding is still the backbone of the institutions. This basic funding will be reduced by up to 15 per cent by 2018. In addition, about 10 per cent of the basic funding will be transferred to the new research funding instruments at the Prime Minister's Office and the Academy of Finland. Part of the loss can in principle be compensated by successfully applying for funds from external sources, such as the Academy of Finland and the EU. It remains to be seen, however, how successful the institutes will be in the tightening competition for research funding.



## 5. Summary: THL and FIOH in the Finnish research and development field

1. THL and FIOH are *nationally central expert organizations* that support the preparation of health and welfare policies, assess policy effects, support the implementation of policies, assess and develop practices, and provide expertise to various actors in the health and social service system (THL) and at workplaces (FIOH). Their profiles are complementary, not overlapping.
2. The work of THL and FIOH is *based on high-level research* and national and international *networking with other expert institutions*. The share of research work is over one third of the total volume of the activities of both institutes. The research activities of THL and FIOH are not based on academic disciplines. Instead, they aim to govern and manage real life societal issues. Therefore, the approach is basically multidisciplinary.
3. *Other important activities* (in addition to research) are also a major part of the institutes' work, for example expert and development work, and data resources. THL also has a number of duties as a public authority (official statistics and registers of health and social services, health protection (prevention of communicable diseases, vaccinations), forensic medicine). FIOH provides specialist advisory services to workplaces, and supports the training of occupational health care personnel. FIOH also provides expertise in the development of work life to various decision-makers.
4. The role of THL and FIOH in the Finnish research field is central. In research on population health and health promotion, as well as on the promotion of occupational health and safety, THL and FIOH are clearly the *leading and most productive institutions* in the country. The two institutes are also important and often leading partners for universities and other research institutions in their branches of research. In their mutual collaboration and in collaboration with universities they seek better efficacy of research, by for instance combining competences and co-utilizing data resources.
5. In addition to research in fields that are international by nature, THL and FIOH have *important roles in research that is more national by character*. This concerns welfare studies and other research on social phenomena in particular.
6. In general, the existence of both THL and FIOH as national institutes is based on the belief that *research-based evidence is crucial in solving national policy problems* in welfare and health policies.
7. Since the year 2000, the national work environment of the two institutes has undergone constant change, as *the role of research and other expertise has been reassessed* in Finland to strengthen support for *innovation and evidence-based decision-making*. As a consequence, organizational changes and rearrangement of the institutes' funding have been on the political agenda for over a decade now. More networking and more competitive funding are among today's key themes.
8. In the near future, THL and FIOH will face *significant cuts* in their funding. Moreover, parts of the institutions' funding will be transferred to new governmental research funding agencies, to be applied for through new procedures. This means diminishing resources and more emphasis on competitive funding for both institutes.

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## **Appendix 1: Databases used in the bibliometric analysis**

The analysis was carried out in the Central Medical Library (Terkko) Bibliometric Services (<http://www.terkko.helsinki.fi/terkko-information-service>) in October 2013.

The following databases were analysed in Thomson Reuters' Web of Knowledge:

Science Citation Index Expanded (SCI-EXPANDED) --1945--present

Social Sciences Citation Index (SSCI) --1956--present

Arts & Humanities Citation Index (A&HCI) --1975--present

Conference Proceedings Citation Index- Science (CPCI-S) --1990--present

Conference Proceedings Citation Index- Social Science & Humanities (CPCI-SSH) --1990--present

Book Citation Index- Science (BKCI-S) --2005--present

Book Citation Index- Social Sciences & Humanities (BKCI-SSH) --2005--present

The time range was 2009--2012

Publications types: Articles, Reviews, Letters

The Impact Factors are from the Journal Citation Reports database

(<http://admin-router.isiknowledge.com/?DestApp=JCR>)

## Appendix 2: Description of core activities of THL and TTL

Core activity	THL	FIOH
R & D	<p>Follow-up studies on the status of health and well-being in the general population</p> <p>Studies on risk factors concerning population health (genetics, health behaviour, environment)</p> <p>Studies on the effects of social and health policy measures and reforms</p> <p>Studies on the equity, efficiency and effectiveness of the health and social service system</p> <p>Research to support the prevention of communicable diseases; vaccination studies</p> <p>Developing practices for the promotion of health and welfare</p>	<p>Work Participation and Sustainable Work Careers</p> <p>Well-being Solutions for the Workplace</p> <p>Effective Occupational Health Services</p> <p>Work Life and the Future</p> <p>User-centric Indoor Environments</p> <p>Brain and Work</p> <p>Nanosafety</p> <p>Social Capital, Health, and Well-being at work</p> <p>Disability Prevention</p> <p>Reformative, future-oriented research</p>
Expertise, co-development, information	<p>Supporting the MSAH programme in the field of health and social services</p> <p>Supporting MSAH preparations for policy and legislation reforms in social and health policies.</p> <p>Supporting the development of information systems for health and social services</p>	<p>See topics above</p> <p>Supporting the MSAH and the Ministry of Employment and Ministry of Education in developing work life and occupational safety and health</p> <p>Facilitating national networks such as the Well-being at Work Forum, the Leadership Development Network and the Zero Accident Forum</p> <p>Co-developing occupational safety and health solutions with enterprises</p>
Work as a public authority	<p>Protection against communicable diseases; Vaccinations</p> <p>Statistical authority in the field of health and social services; Maintenance of a number of registers related to health and social services</p> <p>Forensic medicine services</p>	<p>Not a public authority; some specific commissions (training of occupational health care personnel, research registers, maintaining laboratory preparedness for serious chemical threats in Finland, etc.)</p>

Work with data resources	Registers  Other materials collected for the production of official and other statistics  Research data sets (also for open access)  Biobanks, from data and samples from health inspection surveys etc.	Research registers  Research datasets
Sales in competitive markets	Laboratory services  Publications	Development and training: Work environments Work organizations Occupational health care (partly SGEI)

N.B. This is not a complete detailed description; it only provides a general outline.

All fields of core action are currently (autumn 2013) undergoing reassessment, as a consequence of the budget cuts and reforms in research funding described above.

Some of the core activities may require further clarification. This concerns the work with data resources in particular. As background, it should be mentioned that since 2010, the Government has taken strong efforts to open data sources that have been collected with public funding. "Open data" is seen as an important resource for innovation in product markets. Improved access to data is also an important element in the reform of state research institutions, aiming towards more extensive networking between research institutes and universities, both nationwide and internationally. State research organizations such as THL and FIOH have traditionally had a strong position, almost a monopoly, in maintaining data resources in their own fields. Data resources arise from a number of sources within state research institutes. Some of them are produced as part of research projects, but many others come from official registers and materials collected for official statistics. Other documents of public authorities may also be available for broader use.

This report has been produced for the international evaluations of the THL and the FIOH, which were carried out in 2014 by independent international evaluation groups of experts, appointed by the Ministry of Social Affairs and Health of Finland.

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